UTILITY PATENT APPLICATION
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Title of Invention: Dumbbell adjustable in weight
Inventor: Darren Chermack
Citizen: United States
Residence: 9049 Pillsbury Ave. S., Bloomington, MN 55420
Phone: 952-948-0087

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FIELD OF INVENTION

This invention relates to the exercise equipment field. It is focused toward free weights, utilizing weight-based resistance for exercise movements.

BACKGROUND OF THE INVENTION

Traditional dumbbells and barbells have been used for over a century for building body strength and continue to be used for general fitness, strength and endurance training, and physical rehabilitation.

There are two types of dumbbells: fixed and adjustable.

Fixed dumbbells are typically one solid piece of metal with a handle in the center. Fixed dumbbells present a problem for storage in limited space, being that usually two of each weight increment takes up a significant amount of room. Each set must also be purchased separately, making an entire set rather expensive. A set of fixed dumbbells is also not very portable, specifically moving the entire set is very inconvenient.

There are a variety of adjustable dumbbells designs, ranging from simple to very elaborate. Each of the existing designs has significant drawbacks. They stricken with one or more of the following problems: they take too much time to change weight, are not useable by someone with large hands, are unwieldy, are difficult to change weights, or pose a safety hazard.

The initial designs for adjustable dumbbells included individual disc-shaped weights with holes in the center that would slide onto a round bar and secured to the handle by means of some sort of locking collar. These collars might screw on, use a spring clamp, or have a collar with a threaded locking pin. If the collars are loose or loosen during use, they pose a safety hazard because the weights can fall off the handle.

Some innovative designs of adjustable dumbbells have appeared in the last decade. They use either an internal or external mechanism that attaches a desired number of weights to a handle. Although these designs show some promise, each has drawbacks and limitations.

These limitations include such elements as: external selection mechanisms which pose a safety hazard, mechanisms that are limited in their function, mechanisms that are overly complicated, mechanisms that prohibit general usefulness or user comfort, devices that would not be reliable or sturdy, or some combination of the above. Some concepts that the present devices uses are mentioned in previously submitted material, but are not put together to make a safe, versatile, durable and user-friendly mechanism. There is room among these innovations for further advancement in design and application.

The rack-and-pinion system is not a new technology. The present invention is unique in using not only the rack-and-pinion system, but combining it with a basic gear drive to extend the travel of the sliding elements, increasing the number of weights that the device may hold. This transmission system is also unique in that it further adds both safety and convenience of not having a users hand on the weight selection device during normal use.

The present invention utilizes specific design features that ensure proper function. Unlike previous devices, the present devices contains all of the following features: a rack-and-pinion device contained within the handle, a basic transmission for maximum travel of extendable elements, mechanisms for locking extendable elements in each incremental position, indicator of currently selected weight, and nested weight units that have bars attached to the sides of the plates for required support.

In summary, the present invention is the next generation of adjustable dumbbells, using both established concepts and new design features to create the simplest and safest adjustable dumbbell.

SUMMARY OF INVENTION

The primary objective of the present invention is to provide a compact and easy to use weight lifting system that is not hindered by clumsy design or functional limitations.

The present system involves a handle containing an internal rack-and-pinion mechanism within the grip for selectively attaching a desired number of weights to it. The present system also involves a series of nested weight units, each having two weight plates connected by bars along their outside edge. Each of these plates has receiving holes for the bars which extend from the handle to attach the weights to the handle.

The bars that extend from the handle do so simultaneously by the rack-and-pinion. The first bar is driven by a gear connected by a shaft to a knob on top of the handle. Turning the knob extends or retracts both bars into or out of the aperatures in the weight plates, attaching or separating them from the handle as desired.

BRIEF DESCRIPTION OF FIGURES

FIG. 1 shows a perspective view of the present invention.

FIG. 2 shows a perspective view of the handle.

FIG. 3 shows an exploded view of the mechanism within the handle.

FIG. 4 shows a top cross-section view of the rack-and- pinion mechanism with the handle.

FIG. 5 shows a cross-section view of the ball plungers.

FIG. 6 shows a perspective view of a single weight unit.

FIG. 7 shows an end view of a weight unit

FIG. 8 shows the first two weight units nested one inside the other.

FIG. 9 shows a cross-section view of the holes through three consecutive weight units.

FIG. 10 shows a bar that has not penetrated the hole in the weight unit.

FIG. 11 shows a bar that has penetrated the hole in the weight unit.

FIG. 12 shows a cutaway view of a handle being grasped by a hand.

While the above-identified drawings set forth one embodiment, other embodiments of the present invention are also contemplated. This disclosure presents illustrative embodiments of the present invention by way of representation and not limitation. Numerous other modifications and embodiments can be devised by those skilled in the art which fall within the scope and spirit of the principles of this invention. The drawing figures are not drawn to scale.

DETAILED DESCRIPTION OF THE INVENTION

Component list:

1. Handle Unit
2. Selection Knob
3. Extending Rods
    3a. Teeth
4. Endpiece
5. Grip
6. Drive Gear
7. Center Gear
8. Drive Axle
9. Spring Plunger
    9a. Ball
    9b. Spring
10. Indicator Window
11. Indicator Dial
12. Dial Drive Gear
13. Dial Reduction Gear
14. Dial Indicator Gear
15. Weight Unit
16. Weight Plate
17. Bar
18. Channel
19. Holes
20. Weights
21. Dimples

As shown in FIGS. 1-2, a dumbbell system of the present invention is shown, which comprises of (i) a handle unit **1**, and (ii)a plurality of weights **20**. The handle unit **1** consists of a grip **5** containing an internal mechanism for extending and retracting two extending rods **3,** a selection device **2**, two endpieces **4**, and an indicator window **10** to display the currently selected weight.

FIGS. 3-4 show the mechanism within the grip. The selection knob **2** turns the drive axle **8**, which turns the main drive gear **6**. The main drive gear **6** has gear teeth which engage rack teeth **3a** the side of first extending rod **3**. A center gear **7** is turned by the first extending rod **3** when the main drive gear **6** is turned. The center gear **7** then drives the second extending rod **3** in the direction opposite the first extending rod **3** an equal distance.

The handle unit **1** allows a user to turn the selection knob **2** to select how many weights **20** will be attached to the handle. The main drive gear **6** allows the extending bars **3** a range of travel up to half of their length.

The drive axle **8** has dial drive gear **12** attached to it. Dial drive gear **12** turns dial reduction gear **13**, which in turn drives dial indicator gear **14**. This transmission gives the dial indicator gear **14** the correct travel to display numbers on the attached indicator dial **11**, visible through the indicator window **10** in the handle unit **1**.

The grip **5** contains two spring plungers **9**, which fit into a series of dimples **21** on either extending rod **3**. These dimples **21** are positioned along the length of the extending rods **3** to snap the extending rods **3** into proper position for each weight unit **15** so that the extending rods **3** fill the holes **19** in the weight plates **16**. FIG. 3 shows these spring plungers **9** in an exploded view. FIG. 5 shows a cutaway view of the spring plungers **9** and how they fit into the dimples **21** in the extending rod **3**. Each spring plunger **9** has a ball **9a** and a spring **9b** which brings the ball **9a** toward and into one of the dimples **21** on the extending rod **3**.

FIG. 9 shows a sequence of three weight plates **16** with the holes **19** for accepting one of the extending rods **3**. FIG. 10 shows the hole **19** in the weight plate **16** with the extending rod **3** not engaged. FIG. 11 shows the extending rod **3** inserted into the hole **19** of the weight plate **16**. With the extending rod **3** in the hole **19**, the weight unit **15** is attached to the handle unit **1**.

The weights **20** comprise of a series of nested weight units **15**, with each weight unit **15** fitting inside the next larger weight unit **15**. FIG.6 shows one weight unit **15**. FIG. 8 shows one weight unit **15** sitting within another weight unit **15**. Each weight unit **15** is comprised of two weight plates **16** connected by at least one bar **17** along the outside perimeter. FIG. 8 shows a side view of how each weight unit **15** is configured. The inside weight unit **15** is made up of two weight plates **16** attached by the bar **17**. The outside weight unit **15** is made up of two weight plates **D** attached by the bar **17**.

Each weight unit **15** has two design features: (i) an angle θ, and (ii) an angle Φ[. Angle θ is shown in FIG. 7 and provides easy replacement of the handle unit **1** and any weight units **15** attached to the handle unit **1**. Angle Φ is shown in FIG. 8 also allows for the replacement listed above. Angle Φ may range from 1° to 5°.

FIG. 12 shows a cutaway end view of the present invention's mechanism and configuration. The present invention's configuration provides a large amount of space for a user's hand and wrist to grip the handle **5**. There is enough room for a wrist to grasp the grip **5** from, for example, position **A** or **B,** or anywhere in between. There is even enough room for a user to place two hands on the grip **5**. There is also room for a user to grasp the grip **5** from the bottom, i.e. position **C**, or both the top and bottom. There are no additional supports required for housing functional mechanisms.

Although the present invention has been described with reference to preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.